

APPROVAL SHEET FOR SUSPENDED LOAD OPERATIONS

SLO-KSC-1996-004

TITLE Suspend 1 person in a harness from the 10-ton bridge crane at Hangar AO to simulate an astronaut EVA.

DOCUMENT NUMBER/TITLE _____

PREPARED BY Malcolm Glenn

DATE 5/24/96

REQUIRED APPROVAL

CONTRACTOR _____ DESIGN _____ R & QA _____ OPERATIONS _____ SAFETY
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OPERATION: Suspend 1 person in a harness from the 10-ton bridge crane at Hangar AO to simulate an astronaut EVA.

SUPPORTING DOCUMENTS: The associated System Assurance Analysis (SAA) is as follows:

SAA29AO13-002


10-ton Bridge Cranes - Building AO

GENERAL DESCRIPTION: The following operation requires personnel to work under a suspended load:

Filming for the movie The Cape requires 1 person to be suspended in a harness beneath the lifting sling assembly from the 10-ton bridge crane at Hangar AO to simulate an astronaut EVA.

RATIONALE/ANALYSIS: This suspended load operation complies with the NASA Alternate Safety Standard for Suspended Load Operations as follows:

Alternate Standard Requirement 1a: This operation can not be conducted without placing personnel beneath the suspended load because the operation has been evaluated and it has been determined there are no procedural or operational means to eliminate exposure to a suspended load and still properly simulate an astronaut EVA.

Alternate Standard Requirement 1b: The possible use of a secondary support system to catch the load (lifting sling assembly) in the event of a crane failure was analyzed and determined to be not feasible. The size and location of the lifting beams along with the need to allow free movement of the suspended person and unobstructed camera views make a secondary support system not feasible. A cushioning system on the hangar floor was evaluated and determined not to provide protection for the person because of the location of the lifting beams between the person and the crane. 

Alternate Standard Requirement 1c: The maximum number of personnel allowed under the suspended load is 1.

Alternate Standard Requirement 1d: Filming work with the person suspended beneath the lifting sling assembly will be performed as quickly and safely as possible. This operation requires 1 person to be suspended below the lifting beams for approximately 15 minutes for each camera scene/sequence and an estimated 5 hours total for all the camera scenes/sequences.

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Alternate Standard Requirement 4: This analysis is the governing document for the suspended load operation.

Alternate Standard Requirement 6: The suspended load operations covered by this report are performed at Hangar AO and involve the 10-ton bridge crane. The crane is designed, tested, inspected, maintained and operated in accordance with the NASA Safety Standard for Lifting Devices and Equipment, NSS/GO-1740.9.

The crane is load tested annually at 100% of rated capacity and there is a preventive maintenance program to ensure proper operation. All aspects of the crane controls are verified before each use and load holding/brake capability is tested annually.

The lifting sling assembly is composed of an I-beam and a square beam of box construction. The I-beam portion of the lifting sling assembly has a rating of approximately 13000 lbs. and the square beam portion of the lifting sling assembly is of adequate construction to safely lift and handle at least 500 lbs. The complete lifting sling assembly was load tested to 500 lbs. on March 23, 1996. A visual inspection of the lifting sling assembly was performed after the load test and no anomalies were noted.

The I-beam is estimated to weigh approximately 1000 lbs. and the square beam approximately 50 to 100 lbs.

The personnel harness is rated at 2500 lbs.

Operation of the crane will be by trained and certified operators per KMI 6340.4, Examination and Licensing of KSC Facility Crane Operators.

An individual will be stationed at the crane main circuit breaker during hoisting to immediately remove power, thus setting the brakes, should a failure occur with the crane controls.

Alternate Standard Requirement 7: A SAA has been completed on the Building AO 10-ton bridge crane. The SAA includes a Failure Modes and Effects Analysis/Critical Item List (FMEA/CIL) and Hazard Analysis (see supporting documents).

The SAA identifies one single failure point (SFP), the hoist gear reducer, which transmits power from the hoist motor to the drum. Failure of the gear reducer could cause the load to drop.

There is no history of failure with the SFP in the critical failure mode. The use of high quality, reliable components and a comprehensive maintenance, inspection and test

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inspection and test program (including pre-operational checks) ensures the crane systems operate properly.

The associated CIL sheets identify all the rationale for accepting the risk of the SFP including design information, failure history and operational controls in effect to minimize the risk (maintenance, inspection, test, etc.)

Alternate Standard Requirement 8: Visual inspections of the lifting equipment as well as crane functional checks will be performed prior to use.

Alternate Standard Requirement 9: Trained and certified operators shall man the crane controls at all times when personnel are beneath the suspended load.

Alternate Standard Requirement 10: Appropriate safety control areas are established before initiating operations. Only the minimum number of personnel will be permitted in this area.

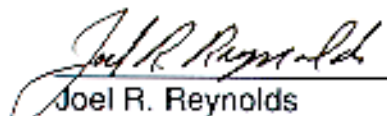
Alternate Standard Requirement 11: A pretask briefing and a safety walkdown of the area are conducted prior to the lift to ensure all systems and personnel are ready to support.

Alternate Standard Requirement 12: Personnel beneath the suspended load will be in voice contact with the crane operator and task leader throughout the operation. At any time during the operation anyone can call a safety hold if they see a discrepancy. The crane operator will have full visual contact with the load throughout the operation.

Alternate Standard Requirement 13: The task leader and crane operator will be in visual contact with the person beneath the suspended load throughout the operation.

Approval:

Date:

 5/24/96
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